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PERSONAL DATA: Born April, 26 1965, U.S. Citizen

EDUCATION:

Ph.D., Applied Physics, Yale University, 1993
Thesis Topic: *Transitions in the Quantum Hall Regime*

M.Phil. Applied Physics, Yale University, 1991
M.S., Applied Physics, Yale University, 1990

B.S. The College of William & Mary, 1987
High Honors – Physics; High Honors - Computer Science (double major)

EMPLOYMENT:

Project Leader, National Institute of Standards and Technology (NIST) (2000-present).

- Lead Team of ~10 Scientists (~8 Ph.D.) to develop metrology for emerging nanoelectronic information processing technologies.
- Initialized and Established NanoElectronic Device Metrology Project.
- Developed Research Teams to investigate (1) Molecular Electronics, (2) Si-based nanoelectronics and (3) organic electronics: three highly-promising nanoelectronic technologies

Physicist, Semiconductor Electronics Division, NIST (1993 - present).

Major Technical Thrusts:

- NanoElectronic Test Structure Development, Assessment, and Characterization (2000-Present).
- Electrical Metrology for CMOS Gate Dielectric Thickness (1995-2000).
- Novel magnetic field characterization techniques for semiconductor materials and devices (III-V & Si-based). (1993-1996).

AWARDS:

Department of Commerce Bronze Metal Recipient,
EEEL Outstanding Authorship Award 2006.
National Research Council Associate (1993-1995),
USAF Laboratory Graduate Fellow (1989-1992),
Becton Fellow (1987),
Presidential Fellow,
National Merit Scholar,

COMMITTEE MEMBERSHIPS, PROFESSIONAL SOCIETY MEMBERSHIPS, AND SIGNIFICANT ACTIVITIES:

- International Semiconductor Device Research Conference Symposium (2003-present),
- IEEE International Reliability Physics Symposium Nanoelectronic Reliability Vice-Chair (2009)
- Symposium Organizer for the Materials Research Society,
- Session Chair and Session Organizer for the March Meeting of the American Physical Society.
- Member of the Technical Advisory Board for the Semiconductor Research Corporation (SRC),
- National Nanotechnology Initiative advisor,
- International Technology Roadmap for Semiconductors Working Group Member.
- National Science Foundation Review Board Member.
- Senior Member of IEEE
- Member of the American Physical Society.

Published Manuscripts

1. "Surface Potential Imaging of Solution Processable Acene-Based Thin Film Transistors," L. C. Teague, B. H. Hamadani, O. D. Jurchescu, S. Subramanian, J. E. Anthony, T. N. Jackson, **C. A. Richter**, D. J. Gundlach, J. G. Kushmerick, *Advanced Materials* **20** (23), 4513-4516 (2008) [DEC 2, 2008].
2. **Invited** "Metrology for the Electrical Characterization of Semiconductor Nanowires," **Curt A. Richter**, Hao D. Xiong, Xiaoxiao Zhu, Wenyong Wang, Vincent M. Stanford, Woong-Ki Hong, Takhee Lee, D.E. Ioannou and Qiliang Li, *IEEE Trans on Electron Devices* **55** (11), 3086-3095 (2008) [NOV 2008].
3. "Silicon Nanowire NVM Cell Using High-k Dielectric Charge Storage Layer," X. Zhu, Y. Yang, Q. Li, D. E. Ioannou, J. S. Suehle, **C. A. Richter**, *Microelectronic Engineering* **85** 2403-2405 (2008) [OCT 2008].
4. **Invited** "Foreword," Agis A. Iliadis and **Curt A. Richter**. *Solid State Elect.* **52** p. 1473 (2008). [OCT 2008].
5. *Molecule-induced interface states dominate charge transport in Si-alkyl-metal junctions*, Lam H Yu, Nadine Gergel-Hackett, Christopher D. Zangmeister, Christina A. Hacker, **Curt A Richter**, James G Kushmerick, *Journal of Physics: Condensed Matter*, **20**, 374114 (2008) [SEP 17 2008].
6. "Three-dimensional simulation study of the improved on/off current ratio in silicon nanowire field-effect transistors," Chang-Yong Choi, Won-Ju Cho, Sang-Mo Koo, John S. Suehle, **Curt A. Richter**, Qiliang Li, Eric M. Vogel, *Journal of the Korean Physical Society* **53**(3) pp. 1680-1684 (2008) [SEPT 2008]
7. "The Integration of Molecular Electronic Devices with Traditional CMOS Technologies," N. Gergel-Hackett, A.A. Hill, C.A. Hacker, **C.A. Richter**, *Proceedings of the 8th IEEE International Conference on Nanotechnology*, 4 pp. (2008) [AUG 2008].
8. "Design, Fabrication and Characterization of High-Performance Silicon Nanowire Transistors," Qiliang Li, Xiaoxiao Zhu, Yang Yang, Dimitris E. Ioannou, Hao D. Xiong, John S. Suehle, and **Curt A. Richter**, *Proceedings of the 8th IEEE International Conference on Nanotechnology*, 4 pp. (2008) [AUG 2008].
9. "Insights into the characterization of polymer-based organic thin-film transistors using capacitance-voltage analysis," B. H. Hamadani, **C. A. Richter**, J. S. Suehle, and D. J. Gundlach, *Applied Physics Letters*, **92**, (2008). [MAY 19 2008].
10. **Invited** "Measurements for the Reliability and Electrical Characterization of Semiconductor Nanowires," Curt A. Richter, Hao D. Xiong, Xiaoxiao Zhu, Wenyong Wang, Vincent M. Stanford, Qiliang Li, D.E. Ioannou, Woong-Ki Hong, Takhee Lee, Proceedings of the IEEE International Reliability Physics Symposium 2008, pp 39-45 (APR 2008).
11. "Stress-Induced Defect Generation in HfO₂/SiO₂ Stacks Observed by using Charge Pumping and Low-Frequency Noise Measurements," Hao D. Xiong, Dawei Heh,

- Shuo Yang, Xiaoxiao Zhu, Moshe Gurfinkel, Gennadi Bersuker, D.E. Ioannou, Curt A. Richter, Kin P. Cheung, John S. Suehle. Proceedings of the IEEE International Reliability Physics Symposium 2008, pp. 319-323. (APR 2008)
12. "Demonstration of Molecular Assembly on Si (100) for CMOS-Compatible Molecule-Based Electronic Devices," Nadine Gergel-Hackett, Christopher D. Zangmeister, Christina A. Hacker, Lee J. Richter, Curt A. Richter, *J. Am. Chem. Soc.; (Communication)*; 130(13) 4259-4261 (2008).
 13. "Contact-induced crystallinity for high-performance soluble acene-based transistors and circuits," D. J. Gundlach, J. E. Royer, S. K. Park, S. Subramanian, O. D. Jurchescu, B. H. Hamadani, A. J. Moad, R. J. Kline, L. C. Teague, O. Kirillov, C. A. Richter, J. G. Kushmerick, L. J. Richter, S. R. Parkin, T. N. Jackson, J. E. Anthony. *Nature Materials*, vol. 7, Is. 3 pp. 216-221, March 2008.
 14. "Probing Molecules in Integrated Silicon-Molecule-Metal Junctions by Inelastic Tunneling Spectroscopy," Wenyong Wang, Adina Scott, Nadine Gergel-Hackett, Christina A. Hacker, David B. Janes, and Curt A. Richter, *Nano Letters* 8 (2), 478 -484, 2008.
 15. "Characterization of electrically active defects in high-k gate dielectrics by using low frequency noise and charge pumping measurements," H.D. Xiong, D. Heh, M. Gurfinkel, Q. Li, Y. Shapira, **C. Richter**, G. Bersuker, R. Choi and J.S. Suehle, *Microelectronic Engineering*, Vol 84, Iss 9-10, pp 2230-2234 September-October 2007.
 16. *Influence of source-drain electric field on mobility and charge transport in organic field-effect transistors*, B. H. Hamadani, **C. A. Richter**, D. J. Gundlach, R. J. Kline, I. McCulloch, and M. Heeney, *J. of Applied Physics* 102, 044503 (2007) (7 pages) [21-AUGUST-2007].
 17. "Silicon Nanowire Memory Application Using Hafnium Oxide Charge Storage Layer," Xiaoxiao Zhu, Qiliang Li, Dimitris E. Ioannou, William A Kimes, John S. Suehle, James E. Maslar, Hao D. Xiong, Shuo Yang, and Curt A. Richter. *2007 International Semiconductor Device Research Symposium* 2007, 2 pp.
 18. *Surface grafting of polypyrrole onto silicon wafers*, D. Sohn, H. Moon, M. J. Fasolka, N. Eidelman, S. M. Koo, C. A. Richter, S. Park, J. J. Kopanski, and E. Amis, *Chemistry Letters*, vol. 36, pp. 1210-1211, Oct 2007.
 19. "Discerning nonlinear channel transport from contact effects in organic FETs," B. H. Hamadani , J. L. LeBoeuf, R. J. Kline, I. McCulloch, M. Heeney, **C. A. Richter**, L. J. Richter, and D. J. Gundlach,. *Proc. SPIE*. 6658 (26-Aug-2007).
 20. *Nanowire Electromechanical Logic Switch*, Qiliang Li, **Curt A. Richter**, Hao D. Xiong, and John S. Suehle, Proceedings of the 7th IEEE International Conference on Nanotechnology, pp. 141-145, August 2 - 5, 2007, Hong Kong.
 21. *Random Telegraph Signals and 1/f Noise in ZnO Nanowire Field Effect Transistors*, Hao D. Xiong, Wenyong Wang, Qiliang Li, **Curt A. Richter**, John S. Suehle, Woong-Ki Hong, Takhee Lee, and Daniel M. Fleetwood, Proceedings of the 7th IEEE International Conference on Nanotechnology, pp. 1139-1143, August 2 - 5, 2007, Hong Kong.
 22. "The Characterization of Silicon-based Molecular Devices," N. Gergel-Hackett, C.A. Hacker, L.J. Richter, O.A. Kirillov, **C.A. Richter**, *Proceedings of the 2007 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics*, published by the American Institute of Physics, 467-471, (2007).

23. *Inelastic Electron Tunneling Spectroscopy of a Molecular Magnetic Tunnel Junction*, Wenyong Wang and **Curt A. Richter**, 2007 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics, AIP Conference Proceedings.
24. *Methods to Characterize the Electrical Properties of Silicon Nanowires*, Qiliang Li, Sang-Mo Koo, Monica D. Edelstein, John S. Suehle, Xiaoxiao Zhu, Dimitris E. Ioannou, and **Curt A. Richter**, 2007 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics, AIP Conference Proceedings.
25. "On-Chip Characterization of Molecular Electronic Devices using CMOS: The Design and Simulation of a Hybrid Circuit Based on Experimental Molecular Electronic Device Results," Nadine Gergel-Hackett, Garrett S. Rose, Peter Paliwoda, Christina A. Hacker, **Curt A. Richter**, *Proceedings of the ACM Great Lakes Symposium on VLSI 2007*, 108-113, (2007).
26. *Random telegraph signals in n-type ZnO nanowire field effect transistors at low temperature*, Hao D. Xiong, Wenyong Wang, Qiliang Li, **Curt A. Richter**, John S. Suehle, Woong-Ki Hong, Takhee Lee, and Daniel M. Fleetwood, *Appl. Phys. Lett.* 91, 053107 (2007) (3 pages) [30-JULY-2007].
27. *Silicon nanowire on oxide/nitride/oxide for memory application*, Qiliang Li, Xiaoxiao Zhu, HaoD Xiong, Sang-Mo Koo, D E Ioannou, Joseph J Kopanski, J S Suehle, and **C A Richter**, *Nanotechnology* **18** (2007) 235204 (4pp) doi:10.1088/0957-4484/18/23/235204 [16-MAY-2007].
28. *Effects of ozonolysis and subsequent growth of quantum dots on the electrical properties of freestanding single-walled carbon nanotube films*, Lucile C. Teague, Sarbajit Banerjee, Stanislaus S. Wong, **Curt A. Richter**, Bindhu Varughese and James D. Batteas, *Chemical Physics Letters* 442 pp 354–359 [02-JUNE-2007].
29. *Silicon nanowire electromechanical switches for logic device application*, Qiliang Li, Sang-Mo Koo, Monica D Edelstein, John S Suehle, and **Curt A Richter**, *Nanotechnology* **18** (2007) 315202 (5pp) doi:10.1088/0957-4484/18/31/315202.
30. *Origin of Differing Reactivities of Aliphatic Chains on H-Si(111) and Oxide Surfaces with Metal*, Christina A. Hacker, **Curt A. Richter**, Nadine Gergel-Hackett, and Lee J. Richter, *J. Phys. Chem. C* **111**, 9384-9392 [05-JUNE-2007].
31. "Low-Frequency Noise Characterizations of ZnO Nanowire Field Effect Transistors," Wang, W.; Xiong, H. D.; Edelstein, M. D.; Gundlach, D. J.; Suehle, J. S.; Hong, W.-K.; Lee, T.; **Richter, C. A.** *Journal of Applied Physics*, 101, 044313 (5 pages) [28-FEB-2007].
32. "Inelastic Electron Tunneling Spectroscopy of Molecular Magnetic Tunnel Junctions," Wang, W., **C.A.Richter**, *Applied Physics Letters* 2006. 89: 153105.
33. "Precise Alignment of single Nanowires and Fabrication of Nanoelectromechanical Switch and Other Test Structures," Li, Q.; Koo, S.-M.; **Richter, C. A.**; Edelstein, M. D.; Bonevich, J. E.; Kopanski, J. J.; Suehle, J. S.; Vogel, E. M. *IEEE Transactions on Nanotechnology* 2006. (accepted, to be published March 2007).
34. "On-Chip Characterization of Molecular Electronic Devices using CMOS: The Design and Simulation of a Hybrid Circuit Based on Experimental Molecular Electronic Device Results," Nadine Gergel-Hackett, Garrett S. Rose, Peter Paliwoda, Christina A. Hacker, **Curt A. Richter**, *Proceedings of the ACM Great Lakes Symposium on VLSI 2007*, (accepted, to be published March 2007).

35. "Interface Characterization of Molecular-Monolayer/SiO₂ Based Molecular Junctions," Richter, C. A.; Hacker, C. A.; Richter, L. J.; Kirillov, O. A.; Suehle, J. S.; Vogel, E. M. *Solid-State Electronics* 2006, 50, p. 1088-1096.
36. "A Comparison of Thickness Values for Very Thin SiO₂ Films by Using Ellipsometric, Capacitance-Voltage, and HRTEM Measurements." James Ehrstein, Curt Richter, Deane Chandler-Horowitz, Eric Vogel, Chadwin Young, Shweta Shah, Dennis Maher, Brendan Foran, P. Y. Hung, and A. Diebold, *Journal of The Electrochemical Society*, 2006. 153(1): p. F12-F19.
37. "Precise Manipulation and Alignment of Single Nanowires for Device Fabrication," Li, Q. L.; Koo, S. M.; Richter, C. A.; Edelstein, M. D.; Kopanski, J. J.; Suehle, J. S.; Vogel, E. M. *2006 IEEE SILICON NANOELECTRONICS WORKSHOP(IEEE Cat. No.) 2006*, 1011-1012.
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39. "Metal reactivity of aliphatic chains tethered to silicon and silicon oxide," Hacker, C. A.; Richter, C. A.; Richter, L. J. *Abstracts Of Papers Of The American Chemical Society 2006*.
40. "Electrical and spectroscopic characterization of metal/monolayer/Si devices." Richter, C.A., C.A. Hacker, and L.J. Richter, *Journal Of Physical Chemistry B*, 2005. 109(46): p. 21836-21841.
41. "Electrical characterization of Al/AlOx/molecule/Ti/Al devices." Richter, C.A., D.R. Stewart, D.A.A. Ohlberg, and R.S. Williams, *Applied Physics A-Materials Science & Processing*, 2005. 80(6): p. 1355-1362.
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47. "Reverse short channel effects in high- k gated nMOSFETs." Han, J.P., S.M. Koo, E.M. Vogel, E.P. Gusev, C. DaEmic, C.A. Richter, and J.S. Suehle, *Microelectronics Reliability*, 2005. 45(5-6): p. 783-785.
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49. "Comparison of Si-O-C interfacial bonding of alcohols and aldehydes on Si(111) formed from dilute solution with ultraviolet irradiation." Hacker, C.A., K.A. Anderson, L.J. Richter, and C.A. Richter, *Langmuir*, 2005. 21(3): p. 882-889.

50. "Influence of a water rinse on the structure and properties of poly(3,4-ethylene dioxythiophene): poly(styrene sulfonate) films." DeLongchamp, D.M., B.D. Vogt, C.M. Brooks, K. Kano, J. Obrzut, C.A. Richter, O.A. Kirillov, and E.K. Lin, *Langmuir*, 2005. 21(24): p. 11480-11483.
51. "Variations in semiconducting polymer microstructure and hole mobility with spin-coating speed." DeLongchamp, D.M., B.M. Vogel, Y. Jung, M.C. Gurau, C.A. Richter, O.A. Kirillov, J. Obrzut, D.A. Fischer, S. Sambasivan, L.J. Richter, and E.K. Lin, *Chemistry Of Materials*, 2005. 17(23): p. 5610-5612.
52. "Comparison of Si-O-C interfacial bonding of alcohols and aldehydes on Si(111) formed from dilute solution with ultraviolet irradiation." Hacker, C.A., K.A. Anderson, L.J. Richter, and C.A. Richter, *Langmuir*, 2005. 21(3): p. 882-889.
53. "Silicon nanowire field effect transistor test structures fabricated by top-down approaches," Koo, S. M.; Li, Q.; Edelstein, M. D.; Richter, C. A.; Vogel, E. M. *2005 International Semiconductor Device Research Symposium (IEEE Cat. No.05EX1272C)* **2005**, 2 pp.-2 pp.
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60. "Comparison of solution-based attachment of alcohols and aldehydes to Si(III) for molecular electronic applications." Hacker, C.A., K.A. Anderson, L.J. Richter, and C.A. Richter, *Abstracts Of Papers Of The American Chemical Society*, 2004. 227: p. U875-U875.
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88. "Overshoot of quantum Hall plateaus." Richter, C.A., R.G. Wheeler, and R.N. Sacks, Surface Science, 1992. 263(1-3): p. 270-274.
89. "New resistivity for high-mobility quantum Hall conductors." McEuen, P.L., A. Szafer, C.A. Richter, B.W. Alphenaar, J.K. Jain, A.D. Stone, R.G. Wheeler, and R.N. Sacks, Physical Review Letters, 1990. 64(17): p. 2062-2065.

Presentations:

1. **Tutorial:** Curt A. Richter and Roger van Zee, “*Molecular-scale components in electronic applications,*” The 8th International Conference on Nanotechnology (IEEE Nano 2008), Arlington, Texas (August 18, 2008)
2. “*Design, Fabrication and Characterization of High-Performance Silicon Nanowire Transistor*” Q. Li, X. Zhu, Y. Yang, D. E. Ioannou, H. D. Xiong, J. S. Suehle and C. A. Richter, The 8th IEEE International Conference on Nanotechnology, Arlington, TX, Aug 19 – 21, 2008.
3. “*The Integration of Molecular Electronic Devices with Traditional CMOS Technologies,*” N. Gergel-Hackett, C.A. Hacker, C.A. Richter, 8th IEEE International Conference on Nanotechnology, August 18-21, 2008, Arlington, TX.
4. “*Capacitance-Voltage Measurements: A Powerful Technique for Characterizing the Contact and Channel Properties of Organic FETs,*” B. H. Hamadani, C. A. Richter, J. S. Suehle, D. J. Gundlach, M. Heeney, I. McCulloch, SPIE Optics + Photonics 2008 Meeting Technical Digest, pg. 113, San Diego, CA, August 2008.
5. *Nanolaminated gold as top metal contact for molecular electronic devices*” M.Coll, C.A.Hacker, D.R.Hines, C.A.Richter, E.D. Williams, 236th American Chemical Society Fall meeting, Philadelphia, PA, August 17-21, 2008.
6. “*Influence of pressure and temperature on molecular conformation in nanolaminated gold-monolayer-semiconductor structure*” M.Coll, C.A.Hacker, D.R.Hines, E.D. Williams, C.A.Richter. Gordon Conference on Electronic Processes in Organic Materials, 7-20-2008.
7. *A Flexible TiO₂-Based Memory Device*, C.A. Richter, N. Gergel-Hackett, B. Hamadani, C.A. Hacker, D. J. Gundlach, 50th Electronic Materials Conference, Santa Barbara, CA. June 25-27, 2008,
8. “*Capacitance-Voltage Characterization of Polymer-Based Organic Thin-Film Transistors,*” B. H. Hamadani, C. A. Richter, J. S. Suehle, D. J. Gundlach, M. Heeney, I. McCulloch, 2008 Electronic Materials Conference Technical Digest, pg. 42, Santa Barbara, CA, June 2008.
9. *In-Situ Vibrational Spectroscopy and Electronic Transport in Metal-Molecule-Silicon Devices*, Adina Scott, Wenyong Wang, Christina Hacker, Nadine Gergel-Hackett, Curt Richter, David Janes, 50th Electronic Materials Conference, Santa Barbara, CA. June 25-27, 2008.
10. “*Si Nanowire NVM cell using high-k dielectric charge storage layer*” X. Zhu, Y. Yang, Q. Li and D. E. Ioannou, C. A. Richter and J. S. Suehle European Materials Research Society(EMRS) Spring Meeting , Strasbourg, France, (May 26-28, 2008).
11. **Invited:** “*Measurements for the Reliability and Electrical Characterization of Semiconductor Nanowires,*” Curt A. Richter, Hao D. Xiong, Xiaoxiao Zhu, Wenyong Wang, Vincent M. Stanford, Qiliang Li, D.E. Ioannou, Woong-Ki Hong, Takhee Lee, The IEEE International Reliability Physics Symposium 2008, Phoenix, AZ (April 29, 2008).
12. **Invited:** *Flexible Solution-Processed TiOx Memory Devices*, N. Gergel-Hackett, B. Hamadani, J. Suehle, C.A. Richter, C.A. Hacker, L.J. Richter, D.J Gundlach, NIST/TEDCO Technology Transfer and Federal Marketplace Event, April 8,2008.
13. “*High performance silicon nanowire field effect transistor and application to non-volatile memory,*” X. Zhu, Y. Yang, Q. Li, D. E. Ioannou, J. S. Suehle and C. A. Richter, Washington Academy of Sciences conferences, Arlington, VA, Mar 29-30, 2008.

14. "Integrating Nontraditional Nanotechnologies and CMOS: A Hybrid Circuit for On-Chip Characterization," N. Gergel-Hackett, A.A. Hill, C.A. Richter, Materials Research Society Spring 2008, San Francisco, CA (March 27, 2008).
15. "Photon Stimulated Capacitance-Voltage Measurement and Characterization of High-*k* Dielectrics," Oleg A. Kirillov, Nhan V. Nguyen, James E. Maslar, William A. Kimes, Weirong Jiang, Kin P. Cheung, John S. Suehle and Curt A. Richter. Materials Research Society Spring 2008, San Francisco, CA (March 26, 2008).
16. "Fabrication and Characterization of Silicon Nanowire Memory with Hafnium Oxide Charge Storage Layer," Xiaoxiao Zhu, Qiliang Li, Yang Yang, William A Kimes, Dimitris E. Ioannou, John S. Suehle, James E. Maslar and Curt A. Richter. Materials Research Society Spring 2008, San Francisco, CA (March 26, 2008).
17. "Noise Characterization of Semiconductor Nanowires," C.A. Richter, H.D. Xiong, V. M. Stanford, Wenyong Wang, Xiaoxiao Zhu, Qiliang Li, Woong-Ki Hong, Takhee Lee, *The 2008 March Meeting of the American Physical Society*, New Orleans, LA (MARCH 11, 2008).
18. "Probing molecules in integrated silicon-molecule-metal junctions by inelastic tunneling spectroscopy," Wenyong Wang, Adina Scott, Nadine Gergel-Hackett, Christina Hacker, David Janes, Curt Richter, *The 2008 March Meeting of the American Physical Society*, New Orleans, LA (MARCH 12, 2008).
19. "High Performance Silicon Nanowire Field Effect Transistor," Qiliang Li, Xiaoxiao Zhu, Yang Yang, Dimitris Ioannou, John Suehle, Curt Richter, *The 2008 March Meeting of the American Physical Society*, New Orleans, LA (MARCH 10, 2008).
20. "Silicon Nanowire Memory Application Using Hafnium Oxide Charge Storage Layer," Xiaoxiao Zhu, Qiliang Li, Dimitris E. Ioannou, William A Kimes, John S. Suehle, James E. Maslar, Hao D. Xiong, Shuo Yang, and Curt A. Richter. *2007 International Semiconductor Device Research Symposium*, College Park, MD (DEC 2007).
21. **Invited:** "Metrology to Enable Emerging Nanoelectronics," C.A. Richter. *The 4th International Congress of Nanotechnology*, San Francisco, California, 11/7/07.
22. **Invited:** "The Integration of Silicon-Based Molecular Electronic Devices with CMOS: A Hybrid Circuit for On-Chip Characterization," N. Gergel-Hackett, A.A. Hill, C.A. Hacker, C.A. Richter, *IEEE/ACM International Symposium on Nanoscale Architectures*, October 21-22nd, 2007, San Jose, CA.
23. "Electron Transport through Silicon-Based Molecular Electronic Devices: Effects of Molecular Chainlength and Molecular Dipole," N. Gergel-Hackett, L.J. Richter, C.D. Zangmeister, C.A. Hacker, C.A. Richter, *American Vacuum Society 54th International Symposium*, Oct 14-19, 2007, Seattle, WA.
24. **Invited Introduction to Nanoelectronic Device Metrology at NIST, Curt A. Richter**, Semiconductor Nanowire Interconnect Technical Exchange Meeting, Palo Alto, CA, September 18, 2007.
25. **Invited An Overview of SNIC Technical Exchange Meetings, Curt A. Richter**, Semiconductor Nanowire Interconnect Technical Exchange Meeting, Palo Alto, CA, September 19, 2007.
26. "Using contacts to induce order and high mobility in solution processed organic TFTs," D. J. Gundlach, J. Royer, B. H. Hamadani, L. C. Teague, **C. A. Richter**, J. G. Kushmerick, L. J. Richter, S. Subramanian, J. E. Anthony, S. K. Park, O. D. Jurchescu, T. N. Jackson, *SPIE Optics + Photonics 2007*, San Diego, CA [26-AUG-2007]

27. "Influence of source-drain electric field on mobility and charge transport in organic field-effect transistors" B. H. Hamadani, R. J. Kline, I. A. McCulloch, M. J. Heeney, **C. A. Richter**, D. J. Gundlach, SPIE Optics + Photonics 2007, San Diego, CA [26-AUG-2007].
28. **Invited Metal-molecule-interface reactions for silicon-based molecular electronics devices** Christina A. Hacker, Lee J. Richter, Nadine Gergel-Hackett, **Curt A. Richter**, 234th ACS National Meeting, Boston, MA, August 22, 2007(oral-invited).
29. *Random Telegraph Signals and 1/f Noise in ZnO Nanowire Field Effect Transistors*, H. Xiong, W. Wang, Q. Li, **C. A. Richter**, J. Suehle, W. Hong, T. Lee, and D. Fleetwood, IEEE Nano Conference, August 5, 2007, Hong Kong, China.
30. *Nanowire Electromechanical Logic Switch*, Qiliang Li , **C. A. Richter**, H. D. Xiong and J. S. Suehle. 2007 IEEE-Nano Conference, August 2-5, 2007, Hong Kong.
31. **Invited Metal Reactivity of Aliphatic Chains Tethered to Silicon and Silicon Oxide** Christina A. Hacker, **Curt A. Richter**, Nadine Gergel-Hackett, Lee J. Richter, Molecular Conduction Workshop 2007, Purdue University, West Lafayette, Indiana, July 18, 2007 (oral-invited).
32. **Invited Silicon-based Molecular Electronic Devices For Hybrid Molecular Device/CMOS Circuits**, N. Gergel-Hackett, C.D. Zangmeister, C.A. Hacker, L.J. Richter, **C.A. Richter**, 5th Annual Molecular Conduction and Sensing Workshop, July 18-20th, 2007, Purdue University, West Lafayette, IN.
33. "Influence of source-drain electric field on mobility and charge transport in organic field-effect transistors" B.H. Hamadani, **C.A.Richter**, D.J. Gundlach, et al. 3rd Annual Organic Microelectronics Workshop, Seattle, WA, (07/10/2007).
34. *Three-dimensional simulation and experimental study on the enhanced on/off current ratio in silicon nanowire field-effect transistors*, Chang-Yong Choi, Yeong-Deuk Jo, Jae-Sang Lee, Joon-Sung Park, Won-Ju Cho, Sang-Mo Koo, Qiliang Li, Monica D. Edelstein, John S. Suehle, **Curt A. Richter**, and Eric M. Vogel. IVC17/ICNT2007, Stockholm, Sweden, July 2-6, 2007.
35. "Characterization of electrically active defects in high-k gate dielectrics by using low frequency noise, charge pumping measurements," Hao D. Xiong, Dawei Heh, Moshe Gurfinkel, Qiliang Li, Yoram Shapira, **Curt Richter**, Gennadi Bersuker, Rino Choi, John S. Suehle, *Insulating Films on Semiconductors-INFOS 2007*, Athens, Greece [JUN-23-2007].
36. "Microstructure-Performance Correlation for Solution Processed Small Molecule TFTs", D.J. Gundlach, J.A. Royer, B.H. Hamadani, O.D. Jurchescu, **C.A. Richter**, O.A. Kirillov, et al. 2007 Electronic Materials Conference, South Bend, IN [20-June-2007].
37. *Inelastic Electron Tunneling Spectroscopy of Molecular Magnetic Tunnel Junctions*, Wenyong Wang and **Curt A. Richter**, International Conference on Nanoscience and Technology, June 5, 2007, Beijing, China.
38. *Low-frequency Noise Characterizations of ZnO Nanowire Field Effect Transistors*, H. Xiong, W. Wang, M. Edelstein, D. Gundlach, J. Suehle, **C. A. Richter**, W. Hong, and T. Lee, International Conference on Nanoscience and Technology, June 4, 2007, Beijing, China.
39. *Three-dimensional simulation and experimental study on the enhanced on/off current ratio in silicon nanowire field-effect transistors*, Chang-Yong Choi, Yeong-Deuk Jo, Jae-Sang Lee, Joon-Sung Park, Won-Ju Cho, Sang-Mo Koo, Qiliang Li, Monica D. Edelstein, John S. Suehle, **Curt A. Richter**, and Eric M. Vogel. IVC17/ICNT2007, Stockholm, Sweden, July 2-6, 2007.

40. *Invited Metrology to Enable Emerging Nanoelectronics*, Curt Richter, 2007 Nano Materials for Defense Applications, San Diego, California, April 23-26, 2007.
41. *Invited Current Status of Electrical Characterization for Molecular Electronics*, Curt Richter, DoD Advisory Group on Electron Devices Special Technology Area Review on Molecular-scale Electronics, Arlington, Virginia, April 17-18, 2007.
42. *Silicon Nanowire Electromechanical Switch for Logic Device Applications*, Qiliang Li, Sang-Mo Koo, Monica D. Edelstein, John S. Suehle, and **Curt A. Richter**, 2007 MRS Spring Meeting, San Francisco, California, April 9-13, 2007.
43. *The Characterization of Silicon-based Molecular Devices*, N. Gergel-Hackett, C.A. Hacker, L.J. Richter, O.A. Kirillov, **C.A. Richter**, 2007 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics, Gaithersburg, MD, March 27-29, 2007.
44. *Inelastic Electron Tunneling Spectroscopy of a Molecular Magnetic Tunnel Junction*, Wenyong Wang and **Curt A. Richter**, International Conference on Frontiers of Characterization and Metrology for Nanoelectronics, Gaithersburg, MD, March 27-29, 2007.
45. *Methods to Characterize the Electrical Properties of Silicon Nanowires*, Qiliang Li, Sang-Mo Koo, Monica D. Edelstein, John S. Suehle, Xiaoxiao Zhu, Dimitris E. Ioannou, and **Curt A. Richter**, 2007 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics, Gaithersburg, MD, March 27-29, 2007.
46. *On-Chip Characterization of Molecular Electronic Devices using CMOS: The Design and Simulation of a Hybrid Circuit Based on Experimental Molecular Electronic Device Results*, Nadine Gergel-Hackett, Garrett S. Rose, Peter Paliwoda, Christina A. Hacker, **Curt A. Richter**, ACM Great Lakes Symposium on VLSI 2007, Stresa-Lago Maggiore, Italy, March 11-13, 2007.
47. *Characterization of Electrical Devices Based Upon Organic Monolayers Directly Attached to Si*, CA Richter, CA Hacker, N Gergel-Hackett, LJ Richter, TC Allison, V Mujica, and CA Gonzalez, March Meeting of the American Physical Society, Denver, Colorado March 5-10, 2007.
48. *Inelastic Electron Tunneling Spectroscopy of a Molecular Magnetic Tunnel Junction*, Wenyong Wang and **Curt A. Richter**, March Meeting of the American Physical Society, Denver, Colorado March 5-10, 2007.
49. *Nanowire Non-volatile Memory with Silicon Nitride Charge Trapping Layer*, Qiliang Li, Xiaoxiao Zhu, D. E. Ioannou, J. S. Suehle, and **C. A. Richter**, March Meeting of the American Physical Society, Denver, Colorado March 5-10, 2007.
50. *Invited The Fabrication of Silicon-Based Molecular Electronic Devices with Enhanced CMOS Integration Potential*, N. Gergel-Hackett, C.A. Hacker, L.J. Richter, O.A. Kirillov, **C.A. Richter**, 12th Advanced Heterostructure Workshop, Hawai'i, HI, December 3-8, 2006.
51. *Metal reactivity of aliphatic chains tethered to silicon and silicon oxide*, Christina Hacker, **Curt Richter**, and Lee Richter, 232nd American Chemical Society National Meeting, San Francisco, California, September 14, 2006.
52. *Invited Emerging Nanoelectronic Devices*, Curt Richter, The 2006 NIST SURF Summer Seminar Series, Gaithersburg, Maryland, July 6, 2006.
53. *Inelastic Electron Tunneling Spectroscopy of Molecular Magnetic Tunnel Junctions*, Wenyong Wang and **Curt Richter**, The 2006 Device Research Conference, State College, Pennsylvania, June 27, 2006.
54. *All Organic Non-Volatile Switching Device Fabricated by Using Conducting Polymer Micropores*, O.A. Kirillov, Oleg Kirillov, John Suehle, Lauren Cohen, Wendy Wu, Dean

- DeLongchamp, **Curt Richter**, The 48th Electronic Materials Conference, University Park, Pennsylvania, June 29, 2006.
55. "Schottky-contact silicon nanowire field effect transistor test structures," S.M. Koo, **Curt Richter**, Q. Li, M. Edelstein, E.M. Vogel, 2006 IEEE Silicon Nanoelectronics Workshop, June 11, 2006.
 56. *Precise Manipulation and Alignment of Single Nanowires for Device Fabrication*, Q. Li, Sang-Mo Koo, **Curt A. Richter**, Monica D. Edelstein, Joseph J. Kopanski, John S. Suehle and Eric M. Vogel 2006 IEEE Silicon Nanoelectronics Workshop, June 11, 2006.
 57. **Invited Silicon Nanowire Field-Effect Transistors by Top-down Approaches**, S.-M. Koo, Q Li, M. D. Edelstein, **Curt Richter** and E. Vogel, Hanyang University, Seoul, Korea, Dec. 18, 2005.
 58. **Invited "Nanoelectronic Device Metrology,"** **Curt Richter**, Harvard University, December 15, 2005.
 59. **Invited Nano-structures and nano-devices in silicon**, S.-M. Koo, Q Li, M. D. Edelstein, **Curt Richter** and E. Vogel, Kwangwoon University, Seoul, Korea, Dec.15, 2005.
 60. **Invited Silicon Nanowire Field Effect Transistor Test Structures Fabricated by Topdown Approaches**, Sang-Mo Koo, Qiliang Li, Monica D. Edelstein, **Curt Richter**, and Eric M.Vogel, 2005 International Semiconductor Device Research Symposium, December 10, 2005.
 61. "Interface Characterization of Molecular-Monolayer/SiO₂ Based Molecular Junctions," **Curt Richter**, C.A. Hacker, L.J. Richter, J.S. Suehle, E.M. Vogel, 2005 International Semiconductor Device Research Symposium, December 8, 2005.
 62. **Invited Ethylene Oxide molecules covalently bonded to silicon and resulting protein resistance**, Christina A. Hacker, Priscilla Lui, David J. Vanderah, **Curt Richter**, Lee J. Richter, 230th ACS National Meeting, Washington, D.C. Aug. 28, 2005.
 63. **Invited "Top-Metal/Molecular Monolayer Interactions and Final Device Performance,"** **Curt Richter**, NASA INAC Molecular Conductivity and Sensor Workshop, July 28, 2005.
 64. **Transport Properties of Silicon Nanowire Field Effect Transistor Test Structures Fabricated by Top-Down Approaches**, S.-M. Koo, A. Fujiwara, **Curt Richter**, E. M. Vogel, Q Li, M. D. Edelstein, J.-P. Han, and J. E. Bonevich, Silicon Nanoelectronics Workshop (SNW), Kyoto, Japan, June 12-13, 2005.
 65. **Invited Curt Richter and J.S. Suehle, "Molecular and Organic Nanoelectronic Devices"** University of Delaware NE&P Seminar Series, May 10, 2005.
 66. **Invited. Curt Richter, "Nanoelectronic Device Metrology."** Semiconductor International's "Metrology in the Nanotech Era" technology webcast. June 22, 2005.
 67. **Invited "Molecular Electronics Tutorial,"** 2005 International Reliability Physics Symposium, **Curt Richter and D.R. Stewart**, San Jose, CA, April 18, 2005.
 68. **Invited Curt Richter, "Electrical and Optical Characterization of Metal/Molecule Interfaces,"** Symposium on Nanotechnology, HP/QRS Labs, San Jose, CA, March 25, 2005.
 69. "Spectroscopic and electrical characterization of buried metal interfaces: Metal-molecule-silicon structures." **L.J. Richter**, **Curt Richter**, and C.A. Hacker, ACS 229th Spring National Meeting, March 2005.
 70. **Spectroscopic Characterization of Buried Metal Interfaces Using Backside FTIR and Metal-Molecule-Silicon Samples.**" **C.A. Hacker**, **Curt Richter**, and L.J. Richter, International Conference on Characterization and Metrology for ULSI Technology, Richardson, TX, USA, Mar. 15-18 2005.

71. *Silicon nanowire field-effect transistors with Schottky barrier source/drain contacts by top-down approach*, S.-M. Koo, M. Edelstein, Q. Li, **Curt Richter** and E. Vogel, International Conference on Characterization and Metrology for ULSI Technology, Richardson, TX, USA, Mar. 15-18 2005.
72. "Electrical characterization of top-metal/molecule interactions in molecular electronic devices." Curt Richter, C.A. Hacker, L.J. Richter Molecular-Scale Electronics VII (Engineering Conferences International), San Diego, CA, Jan. 23-26, 2005.
73. *Spectroscopic characterization of molecule-evaporated metal interface using backside FTIR and metal-molecule-silicon samples*, C.A. Hacker, **Curt Richter**, L.J. Richter, Molecular-Scale Electronics VII (Engineering Conferences International), San Diego, CA, Jan. 23-26, 2005.
74. **Invited** *Next generation semiconductor devices*, S.-M. Koo, J.-P. Han, M.D. Edelstein, **Curt Richter**, and Eric Vogel, Hanyang University, Seoul, Korea, Dec. 14, 2004.
75. **Plenary/Invited** Curt Richter, "NanoElectronic Device Metrology," Nano and Microsystems Technology and Metrology Workshop 2004, Huntsville, Alabama, November 17, 2004.
76. **Invited** *Electron transport at the molecular scale*, Ganesh Ramachandran and **Curt Richter**, University of Maryland, College Park, MD, November 17 2004.
77. *Monolayer formation on semiconductor surfaces for molecular electronics applications*, C.A. Hacker, K.A. Anderson, **Curt Richter**, L.J. Richter, Electronic Processes in Organic Materials (Gordon Research Conference), Mount Holyoke College, South Hadley, MA, 26 July 2004.
78. *Reverse effects in high-k gated nMOSFETs*, J. Han, S. Koo, E.M. Vogel, E.P. Gusev, E.P. Gusev, C. D'Emic, **Curt Richter**, Microelectronic Reliability, Workshop on Dielectrics, Co. Cork, Ireland, Jun 28-30, 2004.
79. **Invited** Curt Richter and E.M. Vogel, "COMPUTATIONAL NEEDS FOR EMERGING MATERIALS: AN EXPERIMENTAL METROLOGIST'S VIEWPOINT." Materials Modeling for Emerging Research Materials Workshop (2005 ITRS), Austin, Texas USA, 6/8/04.
80. *Influence of Buffer Layer Thickness on the Ferroelectric Memory Window of SrBi₂Ta₂O₉/SiN/Si Structures*, J.-P. Han, S.-M. Koo, **Curt Richter**, J.-W. Park, E. M. Vogel, The 16th International Symposium on Integrated Ferroelectrics (ISIF 2004), Gyeongju, Korea, April 5-8, 2004.
81. *Comparison of Solution-Based Attachment of Alcohols and Aldehydes To Si(111)*, Christina Hacker, K.A. Anderson, **Curt Richter**, L.J. Richter, ACS 227th Spring National Meeting, Anaheim, CA, 28 March 2004.
82. **Invited** Curt Richter, "METROLOGY FOR THE INTEGRATION OF NANOELECTRONIC DEVICES." DARPA Workshop on the Integration of Scalable CMOS Systems with Novel Nanostructures, 1/13/04.
83. "ELECTRICAL CHARACTERIZATION OF MOLECULAR MONOLAYERS FORMED BY DIRECT ATTACHMENT TO SI." Curt Richter, C.A. Hacker, L.J. Richter, and E.M. Vogel, 34th Semiconductor Interface Specialists Conference, Arlington, VA USA, 12/4/03.
84. "MOLECULAR ELECTRONIC DEVICES FORMED BY DIRECT MONOLAYER ATTACHMENT TO SILICON." Curt Richter, C.A. Hacker, L.J. Richter, and E.M. Vogel, 2003 International Semiconductor Device Research Symposium, Washington, DC USA, 12/12/03.
85. **Invited** Curt Richter, "Measuring Electrical Properties: From Single Molecules to Moletronic Devices," DARPA Moletronics PI Review Meeting, McLean, VA, 7/27/03.

86. **Invited** Curt Richter, "Metrology for Molecular Electronic Devices", 2003 Summer Workshop on Molecular Conduction, NASA Institute for Nanotechnology and Computing, Purdue University, 7/10/03.
87. *Energy Distribution of Interface Traps in High-K Gated MOSFETs*, J.-P. Han, E. M. Vogel, E.P. Gusev, C. D'Emic, **Curt Richter**, D. W. Heh, J. Suehle, , 2003 VLSI Tech. Symp. Honolulu, Hawaii, June 2003.
88. *Recent Advances and Issues in SiC devices and Nanoelectronics*, S.-M. Koo, **Curt Richter**, and Eric Vogel, Ajou University, Suwon, Korea, May 20, 2003
89. **Invited** Curt Richter and D.R. Stewart, "Metrology for Molecular Electronics", GOMACTech-2003: Countering Asymmetric Threats, Tampa, Florida, April 2003.
90. **Invited** Curt Richter, "Metrology for Molecular Electronics, University of North Texas Materials Science and Engineering Department, Denton, TX, 4/30/2003.
91. *Formation and Characterization of Self-Assembled Monolayers of 2'-fluoro-4,4'-di(phenylethynyl)-1-benzenethiolate on Gold*, Christina A. Hacker, **Curt Richter**, Lee J. Richter, James D. Batteas, Roger D. van Zee, Manuel Marquez, Electron Transfer Through Organic and Biological Bridges session of the 203rd Meeting of the Electrochemical Society Paris, France April, 2003.
92. *Characterization of ultrathin amorphous silicon and correlation with crystalline evolution after thermal annealing*, Jinwon Park, **Curt Richter**, Jin Yong Kim, N. V. Nguyen, John E. Bonevich, and Eric M. Vogel, Spring Meeting of the Materials Research Society (MRS), San Francisco, California. April 2003.
93. **Invited** *Molecular Electronics*, John Suehle and **Curt Richter**, Reliability Engineering Department Seminar Series, University of Maryland, April 29, 2003.
94. *Thickness Evaluation for 2nm SiO₂ Films, a Comparison of Ellipsometric, Capacitance-Voltage and HRTEM Measurements*, J.R. Ehrstein, **Curt Richter**, D.C. Horowitz et al, 2003 Conference on ULSI Metrology. Austin, TX, 25 March 2003.
95. *Characterization of solution-based attachment of organic monolayers to Si(111) for molecular electronic applications*, C. Hacker, **Curt Richter**, and L. J. Richter, The Spring Meeting of the American Chemical Society (ACS). New Orleans, Louisiana, March 2003.
96. **Invited** "Potential Reliability Issues for Molecular Electronics," John Suehle and **Curt Richter**, The Aerospace Corporation, Los Angeles, CA. 12/5/02.
97. **Plenary/Invited**, *Molecular Electronics: What Will Be the Reliability Issues?* John Suehle and **Curt Richter**, 2002 Integrated Reliability Workshop, Lake Tahoe, CA. 10/22/02.
98. "Molecular Electronic Test Structures Based Upon Si₃N₄ Nanopores," Curt Richter C.D. Zangmeister, and W. Wang, 1st International Conference and School Nanoscale/Molecular Mechanics, Maui, Hawaii, May 14, 2002.
99. "Molecular Electronic Test Structures," , " Curt Richter C.D. Zangmeister, and W. Wang, Bulletin of the American Physical Society, Vol. 47, No. 1, pp. 285-285, (01-MAR-2002).
100. *Molecular Electronics at NIST: Moletronics for Metrologists*, R.D. van Zee and **Curt Richter**, Defense Advanced Research Projects Agency (DARPA) and Office of Naval Research (ONR) Moletronics Principal Investigator's Annual Meeting." Phoenix, Arizona January 2002.
101. *Molecular Electronic Metrology*, Roger van Zee and **Curt Richter**, Meeting of the NIST Visiting Committee on Advanced Technology (VCAT), December, 2001.
102. *Molecular Electronics at NIST*, Curt Richter and J.S. Suehle. University of Delaware, Devices and Materials Seminar. Newark, Delaware, November 2001.

103. "Differences Between Quantum-Mechanical Capacitance-Voltage Simulators," Curt Richter, E.M. Vogel, A.M. Hodge, and A.R. Hefner, the 2001 International Conference on Simulation and Semiconductor Processes and Devices, Athens, Greece, September 6, 2001
104. **Invited** "Electrical Characterization: Molecular Test Structures," Curt Richter, DARPA - Washington Area Molecular Electronics, Arlington, VA, June 11, 2001.
105. **Invited** "Electrical Characterization: Molecular Test Structures," Curt Richter, Hewlett-Packard Labs, Palo Alto, CA, May 29, 2001.
106. "Challenges of High-k Gate Dielectrics for Future MOS Devices," J. S. Suehle, E. M. Vogel, M. D. Edelstein, **Curt Richter**, N. V. Nguyen, I. Levin, and D. L. Kaiser, H. Wu, and J. Bernstein, '6th International Symposium on Plasma and Process-Induced Damage, Monterey, CA, May 13-15, 2001.
107. **Invited** "Highlights of Advanced Gate-Dielectric Characterization and Reliability at NIST," Curt Richter and J.S. Suehle, Yale University, New Haven, CT, 3/30/01.
108. *Test chip for electrical linewidth of copper-interconnect features and related parameters.*" M. Cresswell, M.W., N. Arora, R.A. Allen, C.E. Murabito, **Curt Richter**, A. Gupta, L.W. Linholm, D. Pachura, and P. Bendix, 2001 International Conference on Microelectronic Test Structures, Kobe, Japan, March 19-22, 2001.
109. *Issues in High- κ Gate Dielectrics for Future MOS Devices*, E. M. Vogel, M. D. Edelstein, **Curt Richter**, N. V. Nguyen, I. Levin, D. L. Kaiser, H. Wu, and J. Bernstein, IEEE Microelectronics Reliability and Qualification Workshop, Glendale, CA, Oct. 31, 2000.
110. "Optical and Electrical Thickness Measurements of Alternate Gate Dielectrics: a Fundamental Difference," Curt Richter, N.V. Nguyen, E.P. Gusev, T.H. Zabel, and G.B. Alers, 2000 International Conference on Characterization and Metrology for ULSI Technology, Gaithersburg, MD, June 26, 2000.
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